

# **The Drake Automatic Acetylene Generator**



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Alan O'Bright

# The Drake Automatic Acetylene Gas Generator

*Approved by the National  
Board of Fire Underwriters*



Manufactured only by  
**International Heater Company**  
Utica, N. Y.

New York

Chicago

Boston

Denver



**Acetylene**

**A**CETYLENE is pure hydro-carbon gas produced from calcium carbide. It is the most powerful illuminating gas known. Scientists have long been struggling with the problem of the production of this gas for commercial use, which has now been solved by recent inventions for the cheap production of calcium carbide.

**Calcium Carbide**

CALCIUM CARBIDE is a mixture of powdered lime and coke. When exposed to the temperature of the electric furnace, calcium carbide is formed. A lump of calcium carbide brought into contact with water will at once evolve acetylene.

**The Light**

When the gas is generated in a properly constructed generator and delivered to proper burners, it is *the most brilliant illuminating agent* yet discovered. Acetylene gas possesses about fifteen times the illuminating power of the best coal gas, burned in the ordinary flame burner. Its penetrating power is very great, lighting up every nook and corner, giving a steady light and brilliant effect.

**Its Color**

The light is almost pure sunlight. It is without the glare of the arc lamp, the reddish glow of the incandescent lamp, the sickly green of the mantle burner, the flickering of the ordinary gas flame, or the offensive and disagreeable odor of the oil lamp. It is especially recommended for use in the sick room, because of the color, temperature, and steadiness of the flame. *It gives all objects their natural color.*

**Advantages over Electricity**

Besides the great difference in cost (*in favor of acetylene*), acetylene gas is always at the disposal of the consumer; electric light only when the current is turned on. The lighting power of acetylene gas is always the same; the lighting power of the electric lamp is subject to great variations, such as the wear of the lamp and speed at power house. While the electric light *decreases in illumination*, the cost does not decrease, whereas the decrease in illuminating power of acetylene gas (by turning down), decreases the cost in proportion.

**Advantages over Coal Gas**

The house pipes need be only one half as large as those used for common gas, though the common gas size is just as good. If pipes are already in no change is necessary, except a change in burner. The objectionable color of the mantle burners, together with the cost of fixtures and the constant expense of renewing broken mantles, is enough to condemn their use. The following comparative table of cost will give the reader a comprehensive idea of saving over ordinary gas, as well as electricity and oil.

## Comparative Cost of Different Kinds of Light

### Acetylene Gas

**Cost of  
Acetylene  
Gas**

Carbide at 5 cents per pound

Ten 1/2-foot burners = 250 candle power

5 hours' use per day costs.....	\$0.25
30 days or one month, costs.....	7.50
1 year costs.....	90.00

### Electric Light

**Cost of  
Electric  
Light**

Each 16 candle power lamp, 1 cent per hour

Sixteen incandescent lamps = 250 candle power

5 hours' use per day costs.....	\$0.80
<i>Acetylene Gas costs</i> .....	.25
30 days or one month, costs.....	24.00
<i>Acetylene Gas costs</i> .....	7.50
1 year costs.....	288.00
<i>Acetylene Gas costs</i> .....	90.00

### Common Gas, no mantle

**Cost of  
Common Gas  
(No Mantle)**

Gas at \$1.50 per 1,000 cubic feet

Fifteen 5-foot burners = 250 candle power

5 hours' use per day costs.....	\$0.56
<i>Acetylene costs</i> .....	.25
30 days or one month, costs.....	16.80
<i>Acetylene costs</i> .....	7.50
1 year costs.....	201.60
<i>Acetylene costs</i> .....	90.00

### Common Gas, with mantle

**Cost of  
Common Gas  
(With Mantle)**

Gas at \$1.50 per 1,000 cubic feet

Ten 5-foot mantle burners (when new) = 250 candle power

5 hours' use per day costs.....	\$0.37
<i>Acetylene costs</i> .....	.25
30 days or one month, costs.....	11.10
<i>Acetylene costs</i> .....	7.50
1 year costs.....	133.20
<i>Acetylene costs</i> .....	90.00

### Coal Oil Light

**Cost of  
Oil**

Oil at 10 cents per gallon

Seven jumbo oil lamps, rated 35 candle power = 250 candle power

5 hours' use per day costs.....	\$0.28
<i>Acetylene costs</i> .....	.25
30 days or one month, costs.....	8.40
<i>Acetylene costs</i> .....	7.50
1 year costs.....	100.80
<i>Acetylene costs</i> .....	90.00



## Comparative Cost for One Year

250 candle power, 5 hours each day, for one year,  
would cost as follows:

<b>Comparative Cost</b>	Acetylene, Carbide at 5 cents per pound . . . . .	\$90.00
	Incandescent Lamps at 1 cent per hour each . . . . .	288.00
	Common Gas, no mantle, at \$1.50 per 1,000 cubic feet . . . .	201.60
	Common Gas, with mantle, at \$1.50 per 1,000 cubic feet . .	133.20
	Coal Oil at 10 cents per gallon . . . . .	100.80

**The Generator** It has been pointed out that acetylene gas is for all purposes the best and most satisfactory of all known illuminants, but this is true *only* when the generator employed in its production is properly made.

*This is the vital point in the use of acetylene gas.*

**Type of Generators** Acetylene generators, while differing widely as to detail of construction, may be divided into two general types, in one of which a large quantity of calcium carbide is acted upon by a small supply of water. This is known as the *water feed generator*.

In the second type the conditions are reversed, in that comparatively small quantities of calcium carbide are brought into contact with a *large quantity* of water. This class of generator is known as the *carbide feed generator*.

In the water feed generators *much heat is generated*.

In the properly constructed carbide feed generators no heat is generated.

**Cool Generation** Cool generation of the gas is *absolutely* indispensable. This feature cannot be too deeply impressed upon the reader, for it is the very foundation of successful gas generation.

That these assertions may not be taken as merely personal opinions, a few of the many statements of noted scientists are selected and here presented.

**Opinion of Prof. Renouf** EDWARD RENOUF, Professor of Chemistry, Johns Hopkins University, says:—

“Undoubtedly the best generators, and the only ones which from a scientific point of view should be employed, are those in which carbide falls into an excess of water.”

**Opinion of Dr. Pond** DR. GEORGE GILBERT POND, of the Pennsylvania State College, says:—

“It is essential to emphasize the matter of cool generation as one of the utmost importance in acetylene manufacture. The more nearly the generator conforms to the simple experiment of dropping a little

carbide into a large volume of water, the more efficiently will the heat be distributed, and the more perfectly will cool generation be accomplished."

PROF. VIVIAN B. LEWES, Professor of Chemistry, Royal Naval Academy, Greenwich, England, says:—

**Opinion of  
Prof. Lewes**

"In the generation of acetylene from calcic carbide, far too little attention is being paid to the high temperature evolved when any considerable quantity of it is brought into contact with water, and the effect which this has upon the gas. . . . The result of this is that after gas has once been made no automatic arrangement will stop the slow generation of the gas from the carbide until all in the apparatus is decomposed. When the gas is being continuously used this does not matter much, as the slowing down of the evolution of the gas is sufficient to allow the consumption to catch up the make, but when the gas is turned off, if any quantity of carbide be undecomposed the automatic generator with its small holder becomes an active danger, as it will either 'blow' or generate dangerously high pressures. In any form of generator where the quantity of carbide is large the heat generated during the action of the water on the material is quite sufficient to polymerize some of the acetylene into tar-like products which will sometimes cause trouble and stoppages in the pipes, while in any case the high temperature causes a large amount of steam to go forward with the gas, and unless special precautions are adopted to prevent it, such as using a sufficiently large holder, some of this is carried forward to the service pipes."

HENRY HARRISON SUPLEE, American Society of Mechanical Engineers, says:—

**Opinion of  
H. H. Suplee**

"Whatever modified details be adopted to secure these ends, it must be admitted as a result of these experiments that the adding of small quantities of water to comparatively large masses of carbide is not only unadvisable but positively unsafe. It is also found that the hydrated lime which is formed as a result of the decomposition of the carbide will absorb water when warm, which it again gives out on cooling, so that while the generation of gas may have apparently ceased with the stoppage of the water supply it will recommence when the cooling line gives up a portion of its moisture to the as yet undecomposed carbide. One pound of carbide evolves about 900 British thermal units while generating about  $5\frac{1}{2}$  cubic feet of acetylene, so that it would raise the temperature of 6 pounds of water from 62 degrees F. to the boiling point."

M. HENRI MOISSAN, Member de l'Institut, Paris, says:—

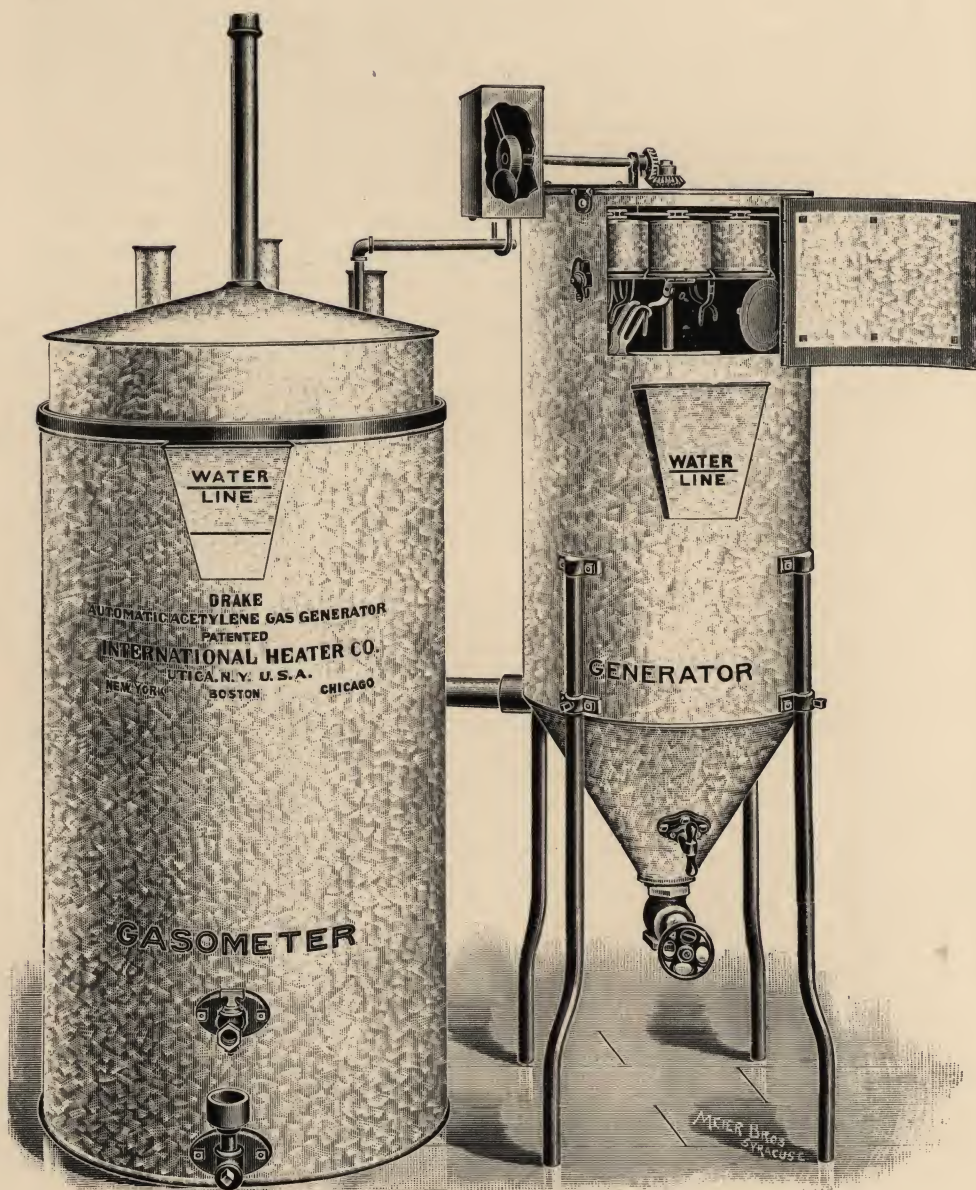
**Opinion of  
M. Moissan**

"If a small quantity of water comes in contact with a large quantity of carbide, the temperature rises, the acetylene polymerizes, and one obtains a gas rich in benzine and other polymers, which lower the candle power and cause it to vary with each instant. Thus one really lights with benzine vapor. Such faulty experiments explain how different observers obtain such widely differing results."



# The Drake Acetylene Gas Generator

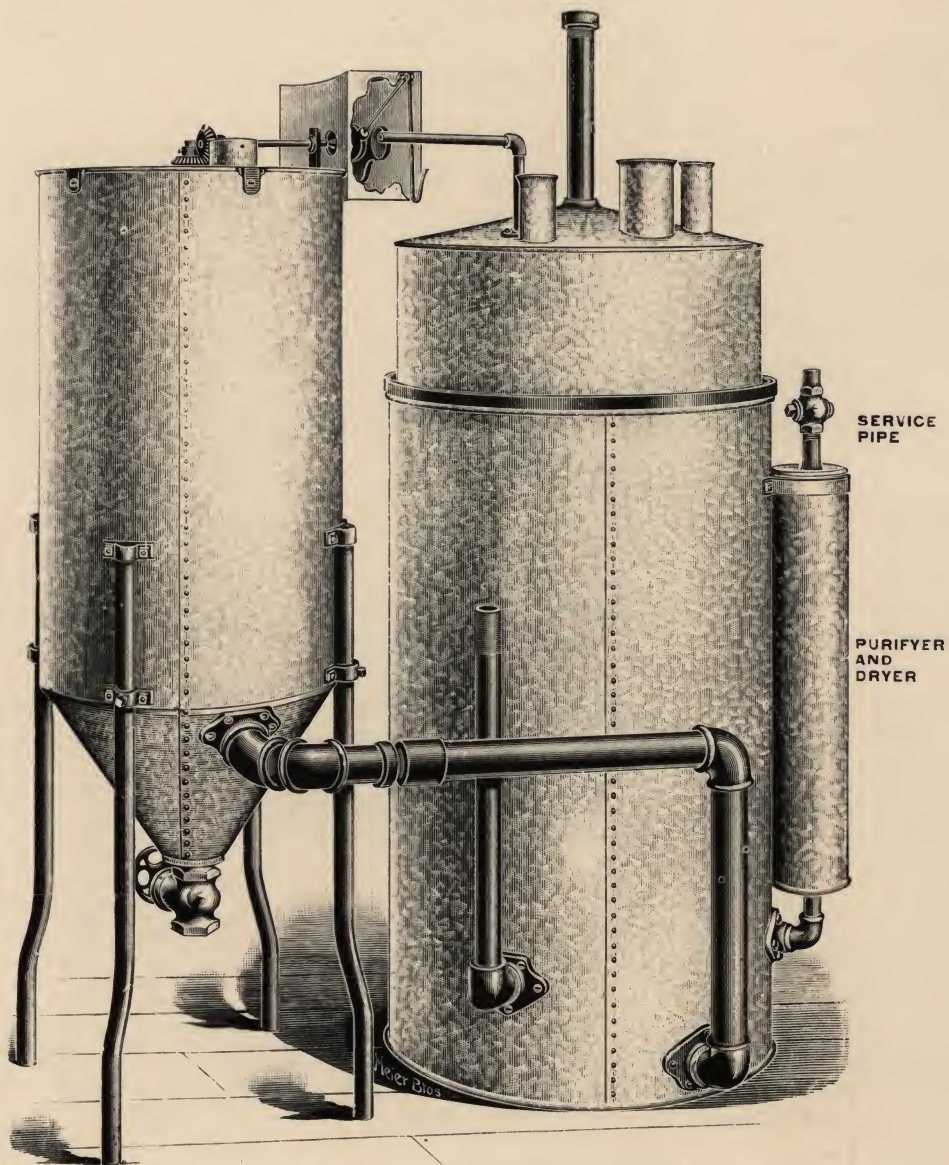
Front View





# The Drake Acetylene Gas Generator

Rear View



Many other authorities might be quoted, but these should certainly be sufficient to convince the unprejudiced that the position for cool generation is well taken. THE RESULT OF HEATED GENERATION IS TO REDUCE THE LUMINOSITY OF THE GAS, TO INCREASE THE IMPURITIES AND TOXICITY (POISONOUS QUALITIES) FORMING COMPOUNDS WHICH FILL THE SERVICE PIPES AND CLOG THE BURNERS.

**Carbide  
Feed  
Generator**

Carbide feed generators are of two classes: those in which fine powdered carbide is used and those using the lump carbide.

In the former, the carbide used being so small, the gas is generated on the surface of the water. In the latter, the carbide being in lumps, it drops to the bottom of the water. The gas, as it generates, rises up through the water, and is of a much better quality.

**The Drake** THE DRAKE GENERATOR is suitable for all places and purposes where light is wanted, from the small cottage in the country, requiring only a few lights, to the large residence in the city, requiring hundreds of lights, or the factory, store, church, school, theater, or any conceivable edifice. The generator may be placed either inside or outside of the building. In this generator are combined the following important features:—

**Simplicity** It is absolutely automatic. *The generation of gas is not a matter of chance, but it is positive and definite.*

**Cool Generation** It automatically drops *measured quantities* of lump carbide into a sufficient amount of water to absorb all heat.

**Dry, Pure Gas** All gas is purified through two separate bodies of water, and then through a combination purifier and dryer.

**Uniform Pressure** Uniform pressure is assured. No possible chance for pipes to fill with water. The weight on the bell does not vary. It is always the same.

**No Over Supply of Gas** Each of the several carbide holding buckets holds only enough carbide to fill the gas bell once full, *no over supply or waste of gas is possible.*

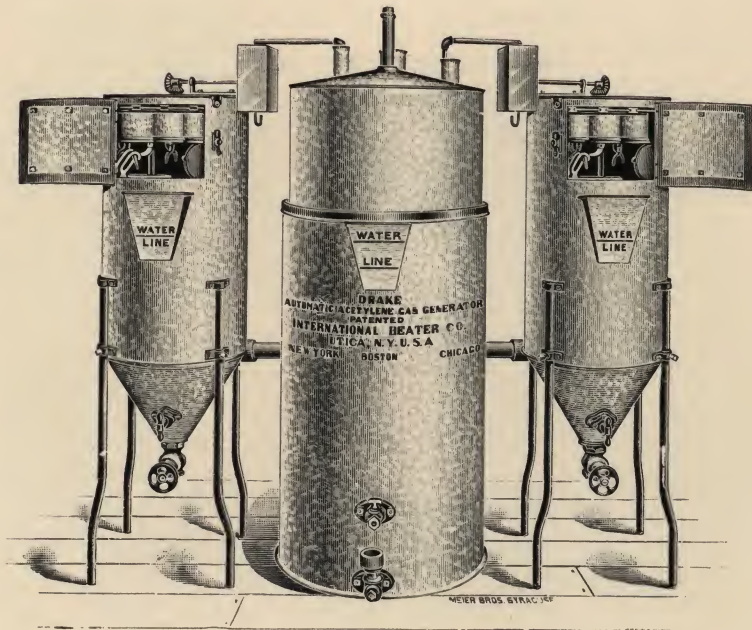
**No Constant Generation** The carbide buckets when closed are sealed against air. The carbide will not slack or generate any gas while standing in the machine. Gas is made only as required for consumption.

**No Loss of Gas when Recharging** The chamber in which the carbide buckets are suspended is separate from and sealed against the gas in generating chamber. *No gas or odor can escape when recharging.* The generating chamber is sealed by water. This prevents any air from entering it.



# The Drake Acetylene Gas Generator

## Double Generator



This illustration shows two Generators supplying one Gasometer.  
This style is used only in the larger sizes, including Nos. 10, 11, and 12.

**Visible Carbide Supply** The visible supply of carbide is all-important. A glance at the carbide buckets will show those that have not been used. You can instantly tell how much carbide remains in the machine, a point not covered by any other generator. *No loss of gas to determine this.*

**Easy to Recharge** The carbide buckets are detachable. One or all can be removed to a more convenient place when filling is necessary, and the operation is without the loss of any gas.

**No Handling of Refuse** The refuse being in liquid form, it can be discharged into a sewer or out of doors without handling, and can be done in comparatively no time.

**No Flushing** By the use of a cone bottom and agitator the refuse runs out freely, and with very little loss of water. Carbide cannot bury itself in the refuse. It rests on a grate which is suspended above the bottom of the generator.

**Charging** The DRAKE is operated as follows:—

Generator *C* and Gasometer *A* are filled with water through filling lips 7 (see cut) up to the marked water line. Condensation chamber *SS* is filled with water through filling lip *S*.

Carbide buckets *Y* are filled with carbide and placed on spider *P*. Trip rod *R* is put up in place so the carbide bucket lever *W* will come in contact with it when the buckets are in motion.

**Operation** The first bucket of carbide is tripped by hand. The carbide falls from the bucket through chute 1 into the generating chamber 2, where it strikes and rests upon the grate 3 until it decomposes. As the carbide decomposes the refuse falls through the grate down into the bottom of the generator. As the gas is formed from the carbide it bubbles up through the water, which purifies it, and as it comes in contact with trapdoor 4 the door closes and prevents any gas from escaping into the carbide chamber 5. When the generation of gas is over, the trapdoor opens to receive the next charge of carbide.

NOTE.—The object of the grate 3 is to prevent the fresh carbide, upon entering the generating chamber 2, from burying itself in the accumulating refuse. If carbide is allowed to bury itself, it will cause a very slow and imperfect generation of gas, and cause some little heat.

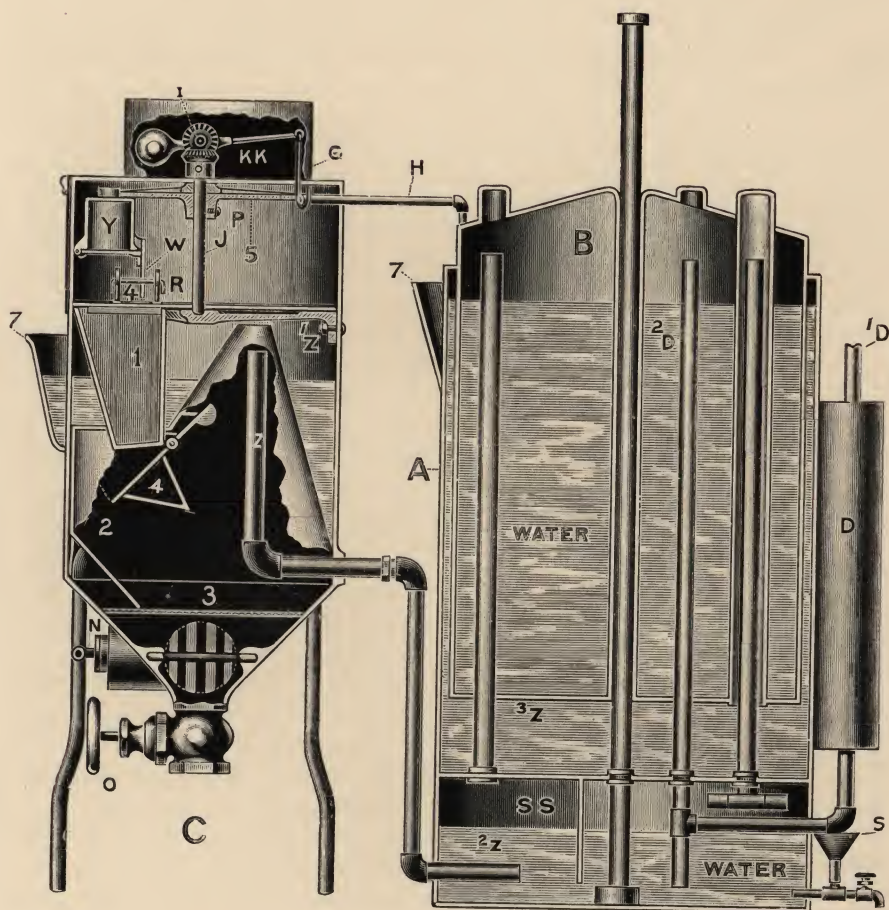
The gas, after passing up through the water in chamber 2, finds an exit from this chamber through pipe *Z*, which conveys it to the condensation chamber *SS*. The gas enters this chamber at 2*Z*, and again is passed through a quantity of water, then to the storage bell *B* by way of pipe 3*Z*.

NOTE.—(One bucket of carbide produces enough gas to about fill the bell *B*.)



# The Drake Acetylene Gas Generator

Interior View



**Operation** As the gas is consumed it finds its way to the burners through pipe 2D. This conveys it through our special dryer D, which renders the gas absolutely dry and pure.

NOTE.—(It will be observed that the gas has been purified through two separate bodies of water, and also through a combination dryer and purifier. By this process all impurities are taken from the gas.)

As the gas is consumed by the burners, the bell B lowers, and in so doing, propelling arm H comes in contact with the ratchet hook arm G, and as the bell continues to lower, the hook arm G is obliged to lower with it, thus the bucket supporting spider P (which is connected with ratchet hook G, by way of shafts I and J, and gears KK) is slowly revolved and the next bucket of carbide dumped.

When all the carbide in the buckets has been used, it becomes necessary to recharge the machine. Agitator handle N is turned a few times, valve O is opened, and the refuse runs out freely. Generator is then refilled with water up to water line. The carbide buckets are filled and replaced on the spider P.

NOTE.—(It will be seen that the generator is provided with a cone-shaped bottom, together with an agitator. This combination allows the refuse to free itself with very little loss of water.)

**Sizes and Capacities**

**Sizes and Capacities of the Drake Automatic Generator**

	Number of ½ foot burners will operate.			Charge of Carbide.	Floor Space.	Height.
	5 hrs.	7½ hrs.	10 hrs.			
No. 1	20	15	10	10 lbs.	2 ½ × 3 ½ ft.	6 ½ ft.
No. 2	40	30	20	20 lbs.	3 × 4 ft.	6 ½ ft.
No. 3	60	45	30	30 lbs.	3 × 5 ½ ft.	6 ½ ft.
No. 4	100	75	50	50 lbs.	3 × 5 ½ ft.	6 ½ ft.
No. 5	150	112	75	75 lbs.	3 ½ × 7 ft.	6 ½ ft.
No. 6	200	150	100	100 lbs.	3 ½ × 7 ft.	6 ½ ft.
No. 7	300	225	150	150 lbs.	4 × 8 ft.	6 ½ ft.
No. 8	400	300	200	200 lbs.	4 × 9 ft.	6 ½ ft.
No. 9	500	375	250	250 lbs.	4 × 10 ft.	6 ½ ft.
No. 10	600	450	300	300 lbs.	4 × 13 ft.	6 ½ ft.
No. 11	800	600	400	400 lbs.	4 × 14 ft.	6 ½ ft.
No. 12	1000	750	500	500 lbs.	4 × 14 ft.	6 ½ ft.

NOTE—Nos. 10, 11, and 12 have double Generators.



## A Few Opinions

If we were to publish a testimonial from each one of the users of the large number of DRAKE GENERATORS which have been sold the reader could get but one impression, "universal satisfaction." The opinions of a few would seem sufficient to show the intending purchaser the entire satisfaction which the user gets from the DRAKE GENERATOR. We therefore print in the closing pages of this book a few personal opinions, accompanied by illustrations of the buildings lighted. Further comment would seem unnecessary.



BUFFALO, N. Y., July 12, 1900.

HERMAN L. PETERS.

*Dear Sir*—The DRAKE ACETYLENE GAS PLANT that you installed for me for the cottage at Oakfield, Grand Island, has worked very satisfactorily during the summer, giving little or no trouble. The light at all times has been perfect, and I am well pleased with the apparatus, and can recommend it to those desiring an efficient and reliable gas for illuminating purposes.

Yours respectfully,

LOUIS H. KNAPP.



**METHODIST EPISCOPAL CHURCH, DEXTER, MAINE**

**Lighted by No. 2 Drake Generator**

DEXTER, ME., August 7, 1900.

INTERNATIONAL HEATER CO.

*Gentlemen*—I beg leave to add my testimony to the efficiency of the DRAKE ACETYLENE GAS GENERATOR which was recently installed in the new Methodist Church by your local agents, Messrs. Fay & Scott. We have had it in use for eight months, and it continues to work perfectly. Being very simple and entirely automatic it requires very little attention, giving us a beautiful, steady, pure white flame, free from smoke or odor, and lighting the church to our entire satisfaction.

Very truly yours,

C. M. SAWYER,

Chairman Building Committee, M. E. Church.





**SPARHAWK HALL, OGUNQUIT, MAINE**

**Lighted by No. 6 Drake Generator**

OGUNQUIT, ME., August 28, 1900.

INTERNATIONAL HEATER CO.

*Gentlemen*—The No. 6 DRAKE ACETYLENE GENERATOR bought of you has been in use for lighting my hotel for the past three months, giving satisfaction to me and pleasure to my guests. At times we have run from 250 to 300 burners, all giving a good light.

In fact, my guests frequently remark that they never saw a better illuminated hotel. I only bought the generator as a temporary source of lighting, as I intended to have an electric light plant, but the acetylene has furnished such a beautiful light that I have continued to use it.

I am sure you will sell several of your machines in this vicinity.

Yours truly,

N. P. M. JACOBS.



**LAKE MEACHAM HOUSE (IN THE ADIRONDACKS), DUANE, N. Y.**

**Lighted by No. 6 Drake Generator**

MEACHAM LAKE, N. Y., August 24, 1900.  
INTERNATIONAL HEATER CO.

*Gentlemen*—In reply to your favor of the 17th, would say that the "DRAKE," bought April, 1899, has been very satisfactory to our people, and needs very little attention. Our guests appreciate the new light very much, and feel it a greater ease for their eyes than that of the old coal oil lamps.

Very truly yours,

LAKE MEACHAM HOTEL CO.

S. M. HOWARD, Manager.





**STORE OF GEORGE BONSER & SON, KENNEBUNK, MAINE**  
 Lighted by No. 2 Drake Generator

KENNEBUNK, ME., August 8, 1900.  
 INTERNATIONAL HEATER CO.

*Gentlemen* — Replying to your inquiry about our DRAKE GENERATOR bought of your agent, Mr. Lunge, last March, we have nothing but words of praise to report. It runs like a clock, and at a satisfactory expense. The light has no equal. In our judgment it is the superior machine of any we have seen.

Yours respectfully,

GEO. BONSER & SON.



**ISLAND ROYAL, ST. LAWRENCE RIVER, ALEXANDRIA BAY, N. Y.  
SUMMER HOME OF MR. ROYAL E. DEANE**

**Lighted by No. 3 Drake Generator**

ALEXANDRIA BAY, N. Y., August 25, 1900.  
INTERNATIONAL HEATER CO.

*Dear Sirs*—I am trying to keep my promise to send a photo of Island Royal by mailing with this a small one showing part of the place, the white spot at the left of the cottage showing the building where the ACETYLENE GAS GENERATOR purchased from you is located. The apparatus is giving entire satisfaction in quality and quantity of the light furnished, ease of management, etc., etc.

Very truly yours,

ROYAL E. DEANE.

Of Bramhall, Deane & Co., 262-266 Water Street, New York





**RESIDENCE OF DR. W. G. McCULLOUGH, TRENTON, N. J.**

**Lighted by No. 2 Drake Generator**

839 State Street, TRENTON, N. J., July 5, 1900.  
INTERNATIONAL HEATER CO.

*Gentlemen*—In reply to your request for my opinion of the DRAKE AUTOMATIC GAS GENERATOR which I purchased of you, I would say that it gives perfect satisfaction. It is perfectly easy to control, gives me ample light, and, above all, does not, as in so many generators which I have examined, clog or gum the burners; there is no smoke, and therefore nothing which could injure the burners or blacken any article in a room. I am perfectly satisfied.

I remain, yours, etc.,

W. G. McCULLOUGH.



**DR. HOLBROOK'S MILITARY SCHOOL, SING SING, N. Y.**

**Lighted by No. 3 Drake Generator**

SING SING, N. Y., July 19, 1900.

INTERNATIONAL HEATER CO.

*Gentlemen*—We have had in constant use in our school since last October the DRAKE ACETYLENE GAS MACHINE. It gives us pleasure to bear testimony to the satisfactory character of the light and to the economy and cleanliness of the process. We feel thoroughly satisfied with the machine, and hope that you will use our testimony as may seem wisest to you in persuading intending purchasers.

Yours very truly,

D. A. HOLBROOK & SONS.





**HOTEL BELLEVUE, BELLEVUE, ERIE COUNTY, N. Y.**

**Lighted by No. 2 Drake Generator**

BELLEVUE, ERIE CO., N. Y., September 9, 1900.  
HERMAN L. PETERS, Buffalo, N. Y.

*Dear Sir*—I have used the No. 2 DRAKE ACETYLENE GENERATOR which you placed in my hotel, for the past three months. Prior to buying this generator of you I had used three different makes of acetylene gas machines, which were not satisfactory. After examining the DRAKE thoroughly I decided to make another trial. The results have been perfectly satisfactory, and I would not part with my DRAKE GENERATOR if I could not get another one.

Yours truly,

HENRY NICHOLS.



**WAGGONER'S HOTEL (ON NIAGARA RIVER), LEWISTON, N. Y.**  
**Lighted by No. 5 Drake Generator**

LEWISTON, N. Y., September 10, 1900.  
HERMAN L. PETERS, Buffalo, N. Y.

*Dear Sir*—The No. 5 DRAKE GAS GENERATOR which you placed in my hotel is giving the best satisfaction, and I think the light which it gives is better than many other makes of gas machines which I have seen.

It is very little trouble to take care of, there is no smell, and I would not part with it for anything.

Yours truly,

C. M. WAGGONER.





**CLUB HOUSE OF SADAQUADA GOLF CLUB, UTICA, N. Y.**

**Lighted by No. 2 Drake Generator**

UTICA, N. Y., September 13, 1900.

INTERNATIONAL HEATER CO.

*Gentlemen*—The DRAKE ACETYLENE GENERATOR which was purchased of you for lighting the Sadaquada Golf Club House has been in constant use for over a year, and the results have been highly satisfactory to us.

It requires little care, and gives a beautiful and economical light.

Yours truly,

THE SADAQUADA GOLF CLUB.

BEECHER M. CROUSE, Captain.

## Note

We can furnish promptly several different makes of acetylene burners, also acetylene gas stoves for cooking. Circulars and prices on application.



